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Management of Cleft Lip and Palate: A Narrative Review

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ABSTRACT

Cleft of lip and palate are the most common serial congenital anomalies to affect the orofacial region. Its occurrence can be isolated or together in various combination and/or along with other congenital deformities.

In addition to aesthetic disfigurement, a child with cleft lip and/or palate suffers functional morbidity such as restricted maxillofacial growth, speech anomalies, swallowing and feeding difficulties, hearing loss and/or recurrent ear infections. Although not generally life-threatening, living with a cleft evoke a significant health burden.

The management of patients with cleft lip and cleft palate is very complex and requires a multidisciplinary team with several treatment interventions

This article aims to review the primary care physicians in literature knowledge about cleft lip and palate.

KEY WORDS: congenital anomalies, multidisciplinary team, feeding problems.

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INTRODUCTION

A cleft is a discontinuity or fissure that occurs as a result of non-fusion of the lip, primary and secondary palate. Clefts being the second most common congenital anomalies of all kinds (most common - clubfoot). These defects constitute one third of all congenital anomalies and the severity of the cleft may range from notching of the upper lip to complete non-fusion of the lip, primary and secondary palate

Cleft lip: The fusion failure of the fronto-nasal and maxillary process, resulting in a cleft of varying extent through the lip, alveolus, and the nasal floor (an incomplete cleft does not extend through the nasal floor, while a complete cleft implies the lack of connection between the alar base and the medial labial element).[1]

Cleft palate: The fusion failure of the palatal shelves of the maxillary processes, which results in the cleft of the hard and/or soft palates.[1] Clefts arise during the fourth developmental stage. Exactly where their appearance is determined by locations at which fusion of various facial processes failed to occur, that in turn is influenced by the time of embryologic life when some interference with the development occurred.[2]

Overall incidence of cleft lip and palate is approximately 1 in 600 to 800 live births (1.42 in 1000) and isolated cleft palate occurs approximately in 1 in 2000 live births. Thus, the typical distribution of cleft types are[3]:

1. Cleft lip alone – 15%
2. Cleft lip and palate – 45%
3. Isolated cleft palate – 40%.

Patient with oro-facial cleft deformity needs to be treated at the right time and at the right age to achieve functional and aesthetic well-being. The treatment process is a complex multidisciplinary and interdisciplinary approach.

EPIDEMIOLOGY

Incidence of clefts in the orofacial region is around 1.5 per 1000 live birth (about 220,000 new cases per year).it has a vast variations across the geographic areas, ethnic group and nature of cleft itself.[4]

The incidence appears high among Asians (0.82 – 4.04 per live births) intermediate among Caucasian (0.9 – 2.69 per

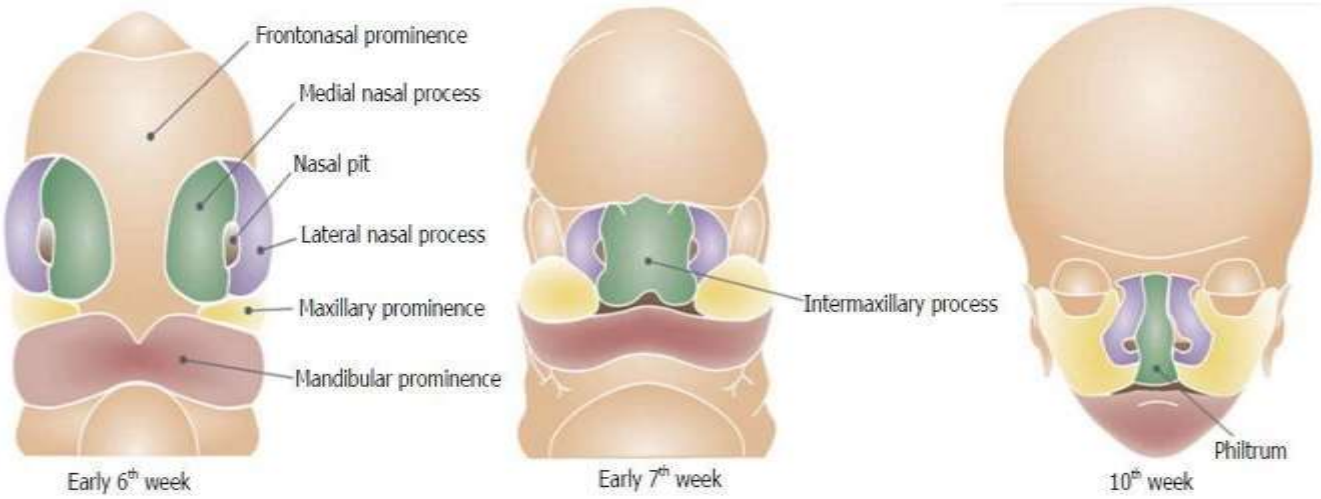
1000 live birth) and low in Africans (0.18 – 1.67 per 1000 live births). Chinese showed 1.76 per 1000 live birth, while Japanese reported 0.85 to 2.68 per 1000 live birth of orofacial cleft.

Various epidemiological studies show that, if one parent affected with the cleft has a 3.2% chance of having a child with cleft lip and palate and a 6.8% chance of having child with isolated cleft palate (Grosen *et al*., 2010). Presence of cleft in one parent and one sibling is associated with a 15.8% chance that the next child will be having cleft lip or palate, and a 14.9% chance that the next child will be having a cleft palate (Christensen *et al*., 1996). In case when the parents with one child affected with a cleft having a 4.4% chance of having another child with a cleft lip and palate and a 2.5% chance of having a child with the isolated cleft palate.(8)

EMBROLOGY

Normal development of lip occurs between weeks 4 and 8 of gestation. By the end of week 4, the frontonasal prominence forms from the migrating neural crest cells of the first pharyngealarch. Nasal placodes, which represents ectodermal thickening, develop at the caudal endof this structure and divide the paired medial and lateral nasal processes. The primarypalate is formed from the fusion of the paired medial nasal processes by week 6, giving rise to premaxilla: central upper lip, maxillary alveolar arch and the four incisor teeth, and hard palate that is anterior to the incisive foramen .

The secondary palate which develops after the primary palate during weeks 6–12. The medial projections from the maxillary processes form palatal shelves which rise above the tongue, which fuse medially at the midline, anteriorly with the primarypalate, and superiorly with the septum.



Deformities of the lip, nose and palate are a result of the disruption of normal development. The severity is defined by the timing andthe amount of disruption.

ETIOLOGY

It is very complex and thought to involve the genetic influences with variable interactions from environmental factors. The etiological factors of cleft lip and palate are grouped as under:

A. Non-genetic: Includes various environmental (teratogenic) risk factors which may cause Cleft lip/ Palate.

Smoking, alcohol, other cause such as maternal diseases, stress during pregnancy chemical exposure.[5] Decreased blood supply in the nasomaxillary region.[6] increased maternal and parental age . Fetal exposure to retinoidal drugs can results in severe craniofacial anomalies.[7]

B. Genetic: Genetic cause includes:

(1)Syndromic: Cleft is associated with other malformation. Usually it may be due to a single gene (monogenic or Mendelian) disorder.

(2)Non-syndromic: Cleft is mostly an isolated feature which occurs in the vast majority of individuals having a cleft lip or palate (up to 70% cases). In this form, the cleft is neither a recognized pattern of malformation nor a known cause for the disorder to be identified.

CLINICAL FEATURES

The various clinical findings can be categorized under two headings:

Dental problems in cleft lip and palate

Natal and neonatal teeth

Microdontia

Taurodontism

Ectopic eruption

Enamel hypoplasia

Delayed tooth maturation

Other associated conditions

1. Speech difficulties

2. Ear infection
3. Feeding problems

Treatment of Cleft Lip and Palate

The role of the orthodontist in cleft management is very essential. The orthodontists the core members of the interdisciplinary group who assist the surgeon at all stages of reconstructive car

Diagrammatic representation of the interdisciplinary team for CLCP patients

STAGE	***TREATMENT***
Infancy	Presurgical nasal and maxillary orthopedics ● Feeding devices ● Pre-surgical orthopedics ● Nasoalveolar moulding ● Primary Lip Surgery ● Cleft Palate Surgery ● Velopharyngeal Dysfunction & its treatment
Deciduous Dentition	Crossbite Correction (if necessary)
Transitional Dentition	Maxillary Expansion Intrusion of Premaxilla Maxillary Protraction Alveolar bone grafting
Permanent Dentition	Comprehensive Orthodontic Treatment Distraction Osteogenesis Orthognathic Surgery

Treatment Timing

Primary Alveolar Bone Grafting	Initial days of life - 2.5 years
Lip Closure (Infant Orthopedics)	10 weeks
Palate Closure Early Secondary Alveolar Bone Grafting	12-18 months 2-5 years

Alignment of maxillary incisors	7-8 years
Secondary Alveolar Bone Grafting (Before eruption of lateral incisor, if it is present, or canine)	7-8 years
Comprehensive Orthodontic Treatment	Adolescence
Late Alveolar Bone Grafting	Late Adolescence
Lip and Nose Revision	Late Adolescence

CONCLUSION

Patients with oro-facial cleft deformity needs to be treated at the right time and at the right age to achieve functional and aesthetic well-being. The mental status of patients with CLP ought to be considered and supported by psychological rehabilitation and their morale should always be boosted. Extensive dental treatment may be required but it should not be made more extensive or complex than is necessary to achieve a reasonable standard of dental perfection. The multidisciplinary approach towards this problem led to a steady and definite improvement in its end results.

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